

We Claim:

1. A heart assist device comprising:
an intraluminal inflatable counter-pulsation balloon, or chamber; and
means to hold the balloon or chamber in place against an inner wall of an
5 arterial vessel.
2. The heart assist device as claimed in claim 1, wherein the balloon or
chamber forms part of a stent having an expandable frame.
3. The heart assist device as claimed in claim 2, wherein the counter-pulsation
balloon or chamber is attached to an inner wall of the frame.
- 10 4. The heart assist device as claimed in claim 2, wherein the frame of the stent
is self expanding.
5. The heart assist device as claimed in claim 4, wherein the frame is formed
of a spring material.
6. The heart assist device as claimed in claim 2, wherein the frame is formed
15 of a shape memory alloy.
7. The heart assist device as claimed in claim 2, wherein the frame is balloon
or chamber expandable.
8. The heart assist device as claimed in claim 2, wherein the stent, including
the balloon or chamber, is packaged into a catheter delivery structure which can be
20 introduced into a suitable artery.
9. The heart assist device as claimed in claim 2, wherein the frame of the stent
is formed of wires.
10. The heart assist device as claimed in claim 9, wherein the frame is covered
with a fabric.

11. The heart assist device as claimed in claim 9, wherein the frame has a coating around its periphery on either the outside or the inside of the frame.

12. The heart assist device as claimed in claim 9, wherein the wires of the stent frame are bare adjacent any vessels branching off from a vessel into which the stent is placed.

13. The heart assist device as claimed in claim 2, wherein the frame defined a lumen and the balloon or chamber extends around the full circumference of the lumen of the frame.

14. The heart assist device as claimed in claim 2, wherein the frame defines a lumen and the balloon or chamber extends around a part of the circumference of the lumen of the frame.

15. The heart assist device as claimed in claim 14, wherein the part of the stent over which the balloon or chamber does not extend are formed as a bare stent so that any branch vessels diverging from the artery in which the stent is positioned will not be occluded.

16. The heart assist device as claimed in claim 1, further including a fluid conducting tube connected to the balloon or chamber.

17. The heart assist device as claimed in claim 2, further including a fluid pressure source connected to the balloon or chamber via the fluid conducting tube, the fluid pressure source adapted to cause the inflatable balloon or chamber to be expanded and contracted in counter-pulsation with the heart of a patient into whom the balloon or chamber has been placed.

18. The heart assist device as claimed in claim 17, wherein the stent is placed intraluminally and then connected to the fluid pressure source by forming an aperture in

the wall of the aorta or other artery and connecting the fluid conducting tube from the fluid pressure source to the balloon or chamber via the aperture.

19. The heart assist device as claimed in claim 18, wherein the fluid conducting tube is a gas carrying tube which exits the body percutaneously.

5 20. The heart assist device as claimed in claim 19, wherein the gas carrying tube is connected to a port on the stent thoracoscopically.

21. The heart assist device as claimed in claim 2, wherein the stent is placed intraluminally and then connected to a fluid pressure source placed in the right chest through a sternotomy.

10 22. The heart assist device as claimed in claim 21, further including a liquid carrying tube is connected through an aortotomy to a port on the stent which is in communication with the interior of the balloon or chamber.

23. A method of assisting the functioning of a heart of a patient, the method including the steps of:

15 holding a heart assist device, that includes an intraluminal inflatable counter-pulsation balloon, or chamber, in place against a wall of an arterial vessel of the patient;

connecting the inflatable balloon or chamber to a fluid pressure source;

energizing the fluid pressure source to expand and contract the inflatable

20 balloon or chamber in counter-pulsation with the heart of a patient into whom the balloon or chamber has been placed.

24. The method as claimed in claim 23, wherein the chamber or balloon is part of a stent comprising an expandable frame and the method includes the step of attaching the counter-pulsation balloon or chamber to the inside wall of the frame.

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25. The method as claimed in claim 23, wherein the method also includes the step of packaging the stent, including the balloon or chamber, into a catheter delivery structure and introducing the structure into a suitable artery.

26. The method as claimed in claim 23, wherein the method also includes the
5 step of placing the stent intraluminally and then connecting it to fluid pressure source by forming an aperture in the wall of the aorta or other artery and connecting a fluid conducting tube from the fluid pressure source to the balloon or chamber.

27. The method as claimed in claim 23 wherein, the method also includes the
10 step of placing the stent intraluminally and then connecting it to a hydraulic driver placed in the right chest through a sternotomy.